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# Five New Species of South American *Gentianella* (Gentianaceae)

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**ABSTRACT.** Five new species of *Gentianella* Moench (Gentianaceae) are described from western South America. *Gentianella decemnectaria* J. S. Pringle, from Peru, is characterized by decumbent stems and nearly rotate corollas with 10 nectaries per corolla. *Gentianella pluviialis* J. S. Pringle, from Bolivia, is similar to *G. florida* (Griseb.) Holub, differing in its larger flowers with bright yellow corollas. *Gentianella pyrostelium* J. S. Pringle, from Peru, is characterized by its columnar habit and red and yellow, scarcely opening corollas. *Gentianella rugicalyx* J. S. Pringle, from Peru, differs from *G. paludicola* (Gilg) J. S. Pringle in its wider, abruptly acute calyx lobes and corolla tube that widens more gradually, and from *G. persquarrosa* (Reimers) J. S. Pringle in its leafier stems and glabrous corollas. *Gentianella sanchezii* J. S. Pringle, from Peru, is characterized by slender, clustered stems arising from a persistent rosette, pedicels mostly longer than the internodes, and widely funnellform, purplish pink corollas.

**RESUMEN.** Se describen cinco nuevas especies de *Gentianella* Moench (Gentianaceae) del oeste de América del Sur. *Gentianella decemnectaria* J. S. Pringle, del Perú, se caracteriza por los tallos decumbentes y las corolas casi rotáceas las cuales llevan 10 nectarios. *Gentianella pluviialis* J. S. Pringle, de Bolivia, se parece a *G. florida* (Griseb.) Holub pero se diferencia por las flores más grandes y las corolas amarillas intensas. *Gentianella pyrostelium* J. S. Pringle, del Perú, se caracteriza por el hábito columnar y las corolas rojas y amarillas las cuales apenas se abren. *Gentianella rugicalyx* J. S. Pringle, del Perú, se diferencia de *G. paludicola* (Gilg) J. S. Pringle por los lóbulos del cáliz más anchos y abruptamente agudos y por el tubo de la corola el cual se ensancha más gradualmente, y de *G. persquarrosa* (Reimers) J. S. Pringle por los tallos más hojosos y las corolas glabras. *Gentianella sanchezii* J. S. Pringle, del Perú, se caracteriza por los tallos delgados agrupados sobre la roseta persistente, los pedicelos en su mayoría más largos que los entrenudos, y las corolas anchamente infundibuliformes lilacino-rosáceas.

**Key words:** Bolivia, Gentianaceae, *Gentianella*, IUCN Red List, Peru.

The genus *Gentianella* Moench (Gentianaceae) is represented by many diverse species in the Andes of South America, where new species continue to be discovered. Consequently, five new species are described here.

**Phenology.** All known specimens of the respective species are cited below, and all collections consist of or include plants in flower. The dates of collection provide the only information on phenology.

**IUCN Red List categories.** Information on distribution is limited to that on the labels, and does not suffice to indicate the local abundance or the extent of the ranges of the five new species of *Gentianella*. Data are therefore deficient for recommended listing according to IUCN Red List criteria (IUCN, 2001).

## 1. *Gentianella decemnectaria* J. S. Pringle, sp. nov.

**TYPE:** Peru. Amazonas: Prov. Chachapoyas, Distr. Leymebamba, ruta a Laguna de Los Cóndores, entre Toronjil y Lajasbamba, borde de camino, 15 Aug. 1998, V. Quipuscoa S., A. Sagástegui A., S. Leiva G. & M. Bejarano C. 1190 (holotype, HAM; isotypes, F not seen, HAO not seen). Figure 1.

Inter *Gentianellas* andinas caulibus decumbentibus proximaliter repentibus, corollis subrotatis violaceis lobis rhombeo-obovatis quam tubo circa 3.6-plo longioribus et nectariis binatis distinguenda.

Synoecious; plants herbaceous,  $\pm$  long-lived monocarpic or perhaps perennial; stems strongly decumbent and  $\pm$  vinelike, proximally 1–4 mm diam., branched, probably to 6–10 dm (as estimated from available specimens); adventitious roots developing from older portions. Leaves medium green, thin-textured; proximal leaves crowded, only scars and persistent bases present at flowering time; leaves gradually more widely spaced distally (internodes 2–10 mm near base of stem, 20–60 mm near inflorescence); midstem and distal leaves many at flowering time, elliptic to lanceolate or ovate, 15–50  $\times$  4–20 mm, 5- to 9-nerved, margins smooth and flat, bases not pseudopetiolate, those of midstem leaves connate-sheathing to 1 mm, those of distal leaves free, apices acute to short-acuminate. Inflorescence an open thyrse, racemoid except for a few 1- to 6-

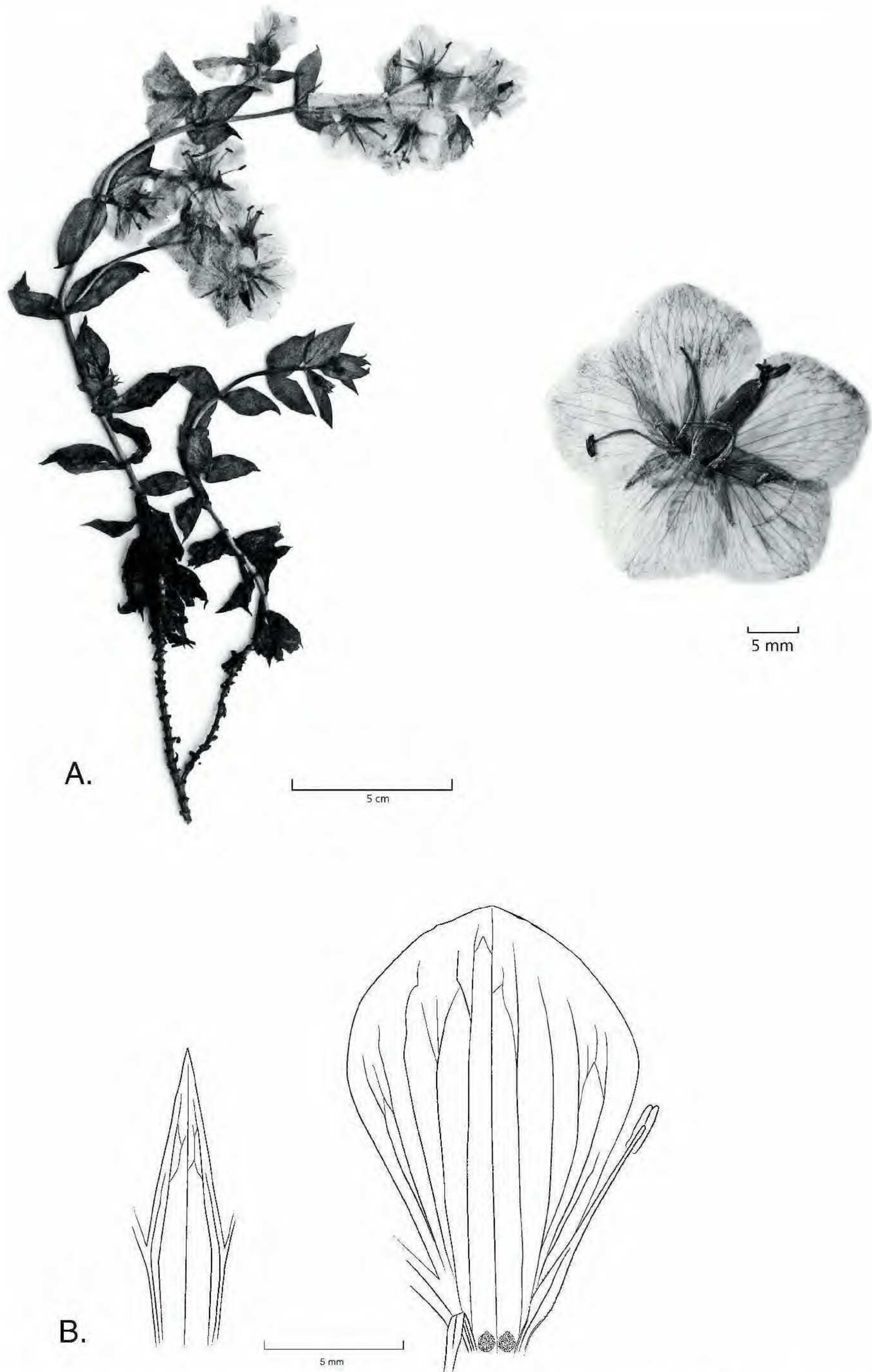


Figure 1. *Gentianella decemnectaria* J. S. Pringle. —A. Holotype, *Quipuscoa S. et al.* 1190: left, flowering stem; right, flower. —B. Details of flower, drawn from the same specimen: left, calyx lobe, abaxial view; right, corolla lobe and stamen, adaxial view.

flowered branches; flowers 12 to ca. 50 per primary stem; pedicels 8–35 mm on main axis, shorter on branches. Calyx 8–14 mm, midveins low-ridged, tube 1.8–4 mm; calyx lobes lanceolate-triangular, (3–)4–9

× 2–4.2 mm (width at base), margins smooth, apices acute; adaxial colleters at base of calyx few and minute or none; corolla lilac or pale violet, nearly rotate, (10–)16–22 mm long when closed, opening to

(22–)30–40 mm diam.; corolla lobes elliptic-rhombic to rhombic-obovate, (10–)12–18 × (5–)10–13 mm, 3.5–4.5× as long as tube, 0.9–1.5× as long as wide, widest at 0.5–0.7× their length, apices obtuse; adaxial trichomes absent; nectaries 10, 1 on each side of each petal midvein, forming 5 pairs between adnate portions of filaments, 1–2 × 0.7–1 mm; filaments inserted at 0.3–0.5× height of corolla tube, 8–10 mm, papillose-scabridulous proximally on both surfaces but more strongly so adaxially, smooth distally, papillose-ciliolate along margins for much of length; anthers purple, 1.4–2.5 mm; ovary with stipe ca. 1 mm at anthesis; stigmas elliptic-oblong, ca. 1.8 × 1.4 mm. Capsule not seen.

*Habitat and distribution.* All specimens of *Gentianella decemnectaria* were collected at 3120–3500 m. Otherwise, information on the habitat of this species is limited to that on the herbarium labels, quoted here.

*Etymology.* The specific epithet *decemnectaria* refers to the 10 nectaries on each corolla.

*Discussion.* Hagen and Kadereit (2001, 2002) characterized *Gentianella*, subject to the exclusion of certain Asiatic species as noted below, as having epipetalous nectaries isomerous with the corolla lobes, one proximal to each lobe. Molecular evidence from their studies indicated that the few species with paired nectaries that had until that time been retained in *Gentianella*, known only from Asia, should be excluded from the genus. The most likely affinities of those species were considered to be with *Comastoma* (Wettst.) Toyok. and *Lomatogonium* A. Braun. With those species excluded, *Gentianella* appeared from this molecular evidence to be monophyletic. Except in *G. decemnectaria*, in all South American species of *Gentianella* examined to date the number of nectaries per corolla equals the number of lobes, normally five. Although *G. decemnectaria* has two nectaries per petal, one on each side of the midvein, nothing about its vegetative or floral morphology suggests a closer relationship to *Comastoma* or *Lomatogonium*, neither of which occurs in South America, or to any group other than Andean *Gentianella*.

Although depth of corolla lobing has been emphasized in some proposals to divide *Gentianella* into sections or segregate genera, lobing is highly variable among the South American species and sometimes differs among otherwise similar species. Even among South American species, however, corollas so nearly rotate constitute another unusual feature of *G. decemnectaria*. The lobes diverge widely

from the summit of the proportionately short corolla tube. In herbarium specimens the corolla lobes are often spread as they would be, for example, in *Catharanthus roseus* (L.) G. Don rather than being pressed in an ascending position. The corolla lobes are more or less rhombic; that is, the margins, rather than forming a continuous curve from near the base to the apex, are nearly straight to slightly concave proximally, abruptly curved near mid-length, and only slightly convex distally. Although the filaments are generally wider distally than proximally throughout *Gentianella*, the relatively long filaments of *G. decemnectaria* taper especially strongly. The minutely papillose-ciliolate margins and proximally papillose-scabridulous surfaces of the filaments are perhaps unique among Andean *Gentianella* species.

The habit of *Gentianella decemnectaria* is unusual for *Gentianella* in that the currently leafy portion of the stem terminates a long, sprawling older portion. The stems elongate for some time before flowering, and the older portions become prostrate or nearly so. Slender adventitious roots arise from some of the many closely spaced proximal nodes. Fragments of a pleurocarpous moss attached to *Boeke 2017* indicate that the stems elongated through a loose, mossy substrate. At most of the nodes, the opposite leaves are basally connate-sheathing. Distally the sheaths are less well developed, and near and in the inflorescences they are absent, not even a transverse ridge connecting the leaf bases.

In its decumbent stems, the size and shape of its leaves, the lobing of its calyx, and the shape and venation of its calyx lobes, *Gentianella decemnectaria* is similar to *G. kuntzei* (Gilg) T. N. Ho & S. W. Liu, of Bolivia. *Gentianella kuntzei* differs in that its pedicels are 5–15 mm, shorter and more slender than those of *G. decemnectaria*; the corolla, although deeply lobed, is only 12–18 mm when closed, with narrowly obovate lobes; the filaments are smooth; and there are only five nectaries per corolla.

In its crowded proximal leaves of which at most only remnants of the basal sheaths remain at flowering time, and in some aspects of its calyx and corolla morphology, *Gentianella decemnectaria* is similar to *G. euphorbiifolia* Fabris. *Gentianella decemnectaria* differs from *G. euphorbiifolia* in its large, paired nectaries, those of *G. euphorbiifolia* being ca. 0.8 mm, one proximal to each corolla lobe. Also, *G. decemnectaria* does not have the unusual floral trichomes of *G. euphorbiifolia*, in which a few relatively long, firm trichomes are borne at the summit of a lateral flange on each side of the adnate portions of the stamens rather than on the adaxial corolla surface. In the size, lobing, and color

of its corollas, *G. decemnectaria* is similar to *G. speciosissima* (Gilg) Zarucchi, which is likewise known from the vicinity of Chachapoyas, but that species differs distinctly in its stiffly erect stem and linear-lanceolate leaves, of which the basal and proximal cauline are the largest, persistent at flowering time.

*Paratypes.* PERU. **Amazonas:** Prov. Chachapoyas, Lajasbamba, jalca, 27 June 1977, *J. D. Boeke 2017* (HAM, NY, U); Prov. Chachapoyas, ca. 4 km past summit at Calla-Calla, rd. Balsas to Leimebamba (27 km from Leimebamba), 6°48'S, 77°50'W, wet cloud forest, 4 Feb. 1985, *B. Stein & C. Todzia 2076* (HAM, MO). **Piura:** Prov. Huancabamba, "Las Huarinjas," Laguna de Shimbe, 13 Jan. 1988, *C. Díaz, H. Osoreo, V. Vásquez & M. Oponete 2662* (HAM, MO). **San Martín:** Prov. Huallaga, Distr. Saposoa, alrededores de la laguna La Artesa, 23 Aug. 2001, *V. Quipuscoa S., M. Vilchez T., M. Kamp & K. Edmunds 2605* (F not seen, HAM, HAO not seen).

**2. *Gentianella pluvialis* J. S. Pringle, sp. nov. TYPE:** Bolivia. Santa Cruz: Prov. [Manuel María] Caballero, Siberia, tramo de 1–2 km subiendo al E por arriba de la escuela, 17°49'S, 64°45'W, ladera de exposición SE, arbustos ralos y pajonale con gramíneas, 24 July 1996, *I. G. Vargas C. & B. Cruz G. 4938* (holotype, HAM; isotypes, NY, USZ not seen). Figure 2.

*Gentianellae floridae* (Griseb.) Holub affinis, sed ab ea floribus majoribus et corollis clare flavis differens.

Dioecious or gynodioecious (see discussion below); plants herbaceous, perennial, height 25–45 cm including inflorescence; caudex stout (ca. 16 mm diam. in type), covered with remains of old leaf bases; stems few, clustered, stiffly erect, 4–9 mm diam. near base. Leaves light green, only midvein prominent, bases not connate-sheathing but connected by a low transverse ridge except sometimes at most distal nodes, margins smooth and flat, apices acute; basal and near-basal leaves crowded, strongly ascending, elliptic-lanceolate, mostly 5–9 cm × 3–8 mm, pseudopetiolate; leaves gradually smaller and less closely spaced distally (median and distal internodes 5–11 cm), appressed-ascending, lanceolate or oblong-lanceolate, not pseudopetiolate. Inflorescence a thyrse, terminal cymules umbelloid; flowers 10 to 50 per stem; pedicels 10–35 mm. Flowers erect; calyx 9–15 mm, tube 4.5–6.5 mm, ridged along commissural veins, sinuses varying in depth on same calyx; calyx lobes triangular, 4.5–9.5 × 2.3–4 mm (width at base), margins smooth, apices acute; colleters at and near base of calyx few, minute; corolla bright yellow ("intenso muy vistoso," in sched., type), campanulate, 15–25 mm long, probably opening to ca. 1 cm diam.; corolla lobes obovate, 10–16 × 5–9 mm, 2.5–

3× as long as tube and 1.6–2× as long as wide, widest at 0.5–0.6× their length, margins minutely erose toward apex, apices obtuse to rounded; a few scattered purple-tipped trichomes ca. 0.25 mm long on adaxial surface of corolla tube between stamen insertion and sinuses; nectaries 5, ca. 1.5 × 1.2 mm; pistillate flowers with nonfunctional anthers, ca. 1 mm, subsessile at ca. 0.4× height of corolla tube; staminate plants not seen; ovary sessile; stigmas deltoid-ovate, 2–2.5 × 2–2.5 mm, margins revolute. Capsule not seen.

*Habitat and distribution.* The holotype of the name *Gentianella pluvialis* was collected at 3000–3050 m and the paratype at 2700 m. Otherwise, information on the habitat of this species is limited to that on the herbarium labels, quoted here.

*Vernacular names and etymology.* Vernacular names are given on the label of the holotype as "para thica" and "flor de la lluvia." The specific epithet of the new species is the Latin translation of both the indigenous and the Spanish names.

*Discussion.* At lengths to 2.5 mm, the stigmas of the functional pistils of *Gentianella pluvialis* are two or more times as large as those of most other South American *Gentianella* species. The nectaries to 1.5 mm are also large for the genus.

Although in most species of *Gentianella* all plants produce bisexual flowers only, Gilg (1916), Juárez de Varela (1997), and Filippa and Barboza (2006a, 2006b) have reported additional breeding systems in several Bolivian and Argentinian species. According to those authors, *G. chrysantha* (Gilg) T. N. Ho & S. W. Liu, *G. florida* (Griseb.) Holub, and probably *G. benedictae* (Gilg) Fabris and *G. bromifolia* (Griseb.) T. N. Ho & S. W. Liu are gynodioecious, with some plants producing bisexual flowers and other plants producing pistillate flowers only; *G. thiosphaera* (Gilg) Holub (including *Gentiana comparapana* Gilg and *G. macroclada* Gilg) is trimonoecious, with bisexual, pistillate, and staminate flowers on the same plants; *Gentianella fabrisii* Filippa & Barboza, *G. imberbis* (Griseb.) Filippa & Barboza, *G. kurtzii* (Gilg) Fabris, *G. multiflora* (Griseb.) Fabris, and *G. myriantha* (Gilg) Holub are gynomonocious, with both bisexual and pistillate flowers on the same plants; and *G. bangii* (Gilg) Fabris ex T. N. Ho & S. W. Liu appears to be andromonoecious, with individual plants producing both bisexual and staminate flowers. Plants of southern Ecuador, provisionally included in *G. dacrydioides* (Gilg) Weaver & Rüdénberg, and a new species from northern Peru, both under study at the time of this

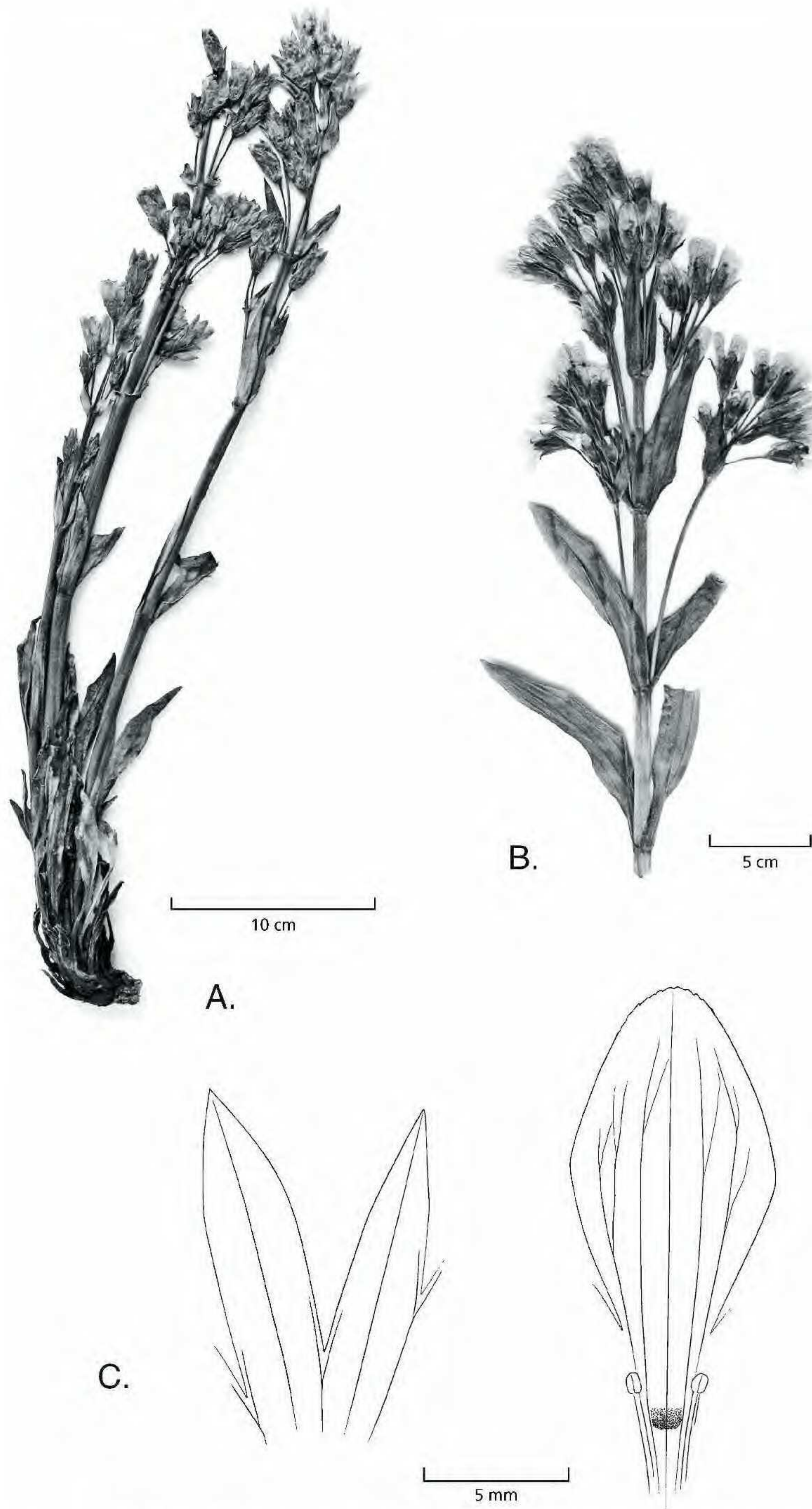


Figure 2. *Gentianella pluvialis* J. S. Pringle. —A. Holotype, Vargas C. & Cruz G. 4938: left, plant; right, portion of inflorescence. —B. Details of flower, drawn from the same specimen: left, two calyx lobes, abaxial view; right, corolla lobe and sterile stamens, adaxial view.

writing, produce unisexual pistillate flowers and appear likely to be gynodioecious. Gynomonoecy and, less often, gynodioecy have also been reported in *Gentianella* species in Australia and New Zealand

(Glenny, 2004). *Gentianella pluvialis* is morphologically most similar to the gynodioecious Argentinian and Bolivian species, but because it is known only from the collections cited in this paper, neither of

which includes plants with functional stamens, it is not known whether this new species is strictly dioecious or gynodioecious.

*Gentianella pluvialis* is probably closely related to *G. florida* (provisionally including *Gentiana tatei* Rusby and *G. tradescantiifolia* Britton ex Rusby), which is relatively widely distributed in Bolivia and northern Argentina. Both species are perennials with a stout caudex and clustered, erect stems, and in both the corolla lobes are longer than the tube. From *G. florida*, *G. pluvialis* differs most conspicuously in its longer pedicels, larger flowers, and bright yellow corollas. Although in *G. florida* the pedicels at the proximal cyme divisions are sometimes as long as 30 mm, most of the pedicels of that species are 2–20 mm, with many of the distal pedicels being less than 10 mm. The calyces of *G. florida* are 3–7.5 mm, with the commissural veins not ridged, and the corollas are 7–15 mm, white or yellowish white when fresh.

*Gentianella thiosphaera* and *G. bangii* (including *Gentiana totorensis* Gilg) are monocarpic, with a single stem and a taproot, with no caudex development and no basal leaves at flowering time, and differ from *G. pluvialis* in their lower stature and more slender stems. The corollas of *G. bangii* are 11–16 mm, white or yellowish white, and the corolla tube of *G. thiosphaera* is longer than the lobes. *Gentianella benedictae*, although likewise tall and stout-stemmed, differs from *G. pluvialis* in its widely elliptic to ovate leaves, the proximal leaves having a pseudopetiole often longer than the blade; dense, subglobose clusters of flowers terminating the stem and on axillary peduncles to 15 cm; and pale yellow corollas with the tube longer than the lobes.

In all other gynodioecious and trimonoecious species of *Gentianella* known from South America, and in the gynomonoeious species *G. imberbis* and *G. multiflora*, the corolla tube is as long as or longer than the lobes. All of the gynomonoeious species except *G. multiflora* also differ in having few-flowered inflorescences and blue to lilac corollas.

*Paratype.* BOLIVIA. **Cochabamba:** Prov. Carrasco, Montepunco, entrando por los Yungas, bosque arbustivo bajo, en zona nubosa, 18 Oct. 1984, S. G. Beck 8936 (HAM, LPB not seen).

### 3. *Gentianella pyrostelium* J. S. Pringle, sp. nov.

**TYPE:** Peru. La Libertad: Prov. Bolívar, ascenso ao Nevado de Cajamarquilla, 7°08'S, 77°42'W, 10 Nov. 2001, I. Sánchez V., M. Dillon & G. Iberico V. 11175 (holotype, HAM; isotypes, CPUN not seen, F not seen). Figure 3.

Inter *Gentianellas* andinas habitu columnari caule solitario erecto, floribus in cymulis et solitariis in axillas

fere omnes rosulam supra dispositis, corollis flavis abaxialiter rubrosuffusis vix aperientibus et capsulis anguste alatis distinguenda.

Synoeious; plants apparently monocarpic; taproot persistent; stem 1, erect, 1–2 dm including inflorescence, 4–6 mm diam. near base, simple except for short branches in inflorescence; remains of numerous leaf bases present below rosette at flowering time. Leaves dark green, margins slightly thickened, smooth; bases not pseudopetiolate, neither connate-sheathing nor connected by ridge; rosette of 10 to 20 basal and near-basal leaves present at flowering time; first 1 or 2 internodes above rosette 2–4 cm, longer than leaves, internodes gradually shorter distally; rosette leaves narrowly obovate to elliptic, 10–35 × 7–12 mm, 3- to 7-nerved, apices obtuse; cauline leaves elliptic to narrowly ovate, leaves gradually smaller distally, more acute. Flowers many, ascending, in all or most axils above near-basal, flowers in proximal axils sometimes in cymules of 3 to 5 on strongly ascending branches 1–3 cm long, those in distal axils solitary or in subsessile cymules of 2 or 3; pedicels 2–10 mm. Calyx campanulate, 7–9 mm, neither tube nor lobes keeled or conspicuously ridged; calyx lobes ovate-triangular to lanceolate-triangular, 3–4 × 1.5–4 mm (width at base) (outermost lobes wider than inner), margins smooth, apices acute; adaxial colleters at base of calyx many, dense; corolla yellow, abaxially much suffused with red, especially distally and toward edges of lobes first exposed in bud, narrowly urceolate, remaining closed or opening only slightly, 13–17 mm; corolla lobes obovate, 6–9 × 4.5–6 mm, 1.4–1.5× as long as tube and 1.3–1.5× as long as wide but somewhat hooded, especially toward side concealed in bud, therefore appearing narrower, rounded at apex; adaxial trichomes absent; nectaries 5, ca. 0.8 × 0.8 mm; filaments inserted at ca. 0.45× height of corolla tube, 6–7 mm; anthers probably pale yellow with purple suffusion when fresh, ca. 1.6 mm; ovary sessile; stigmas semicircular, ca. 1 × 1.2 mm. Capsule with distal 1/5 winged along carpel midveins, wings ca. 0.25 mm wide; sutures with a narrower wing from base to apex.

*Habitat and distribution.* The type of the name *Gentianella pyrostelium* was collected at 3000 m. Otherwise, information on the habitat of this species is limited to that on the herbarium label, quoted above.

*Etymology.* The specific epithet *pyrostelium*, inspired by Exodus 13:21–22, means “a little pillar of fire.” Being a noun in apposition rather than an

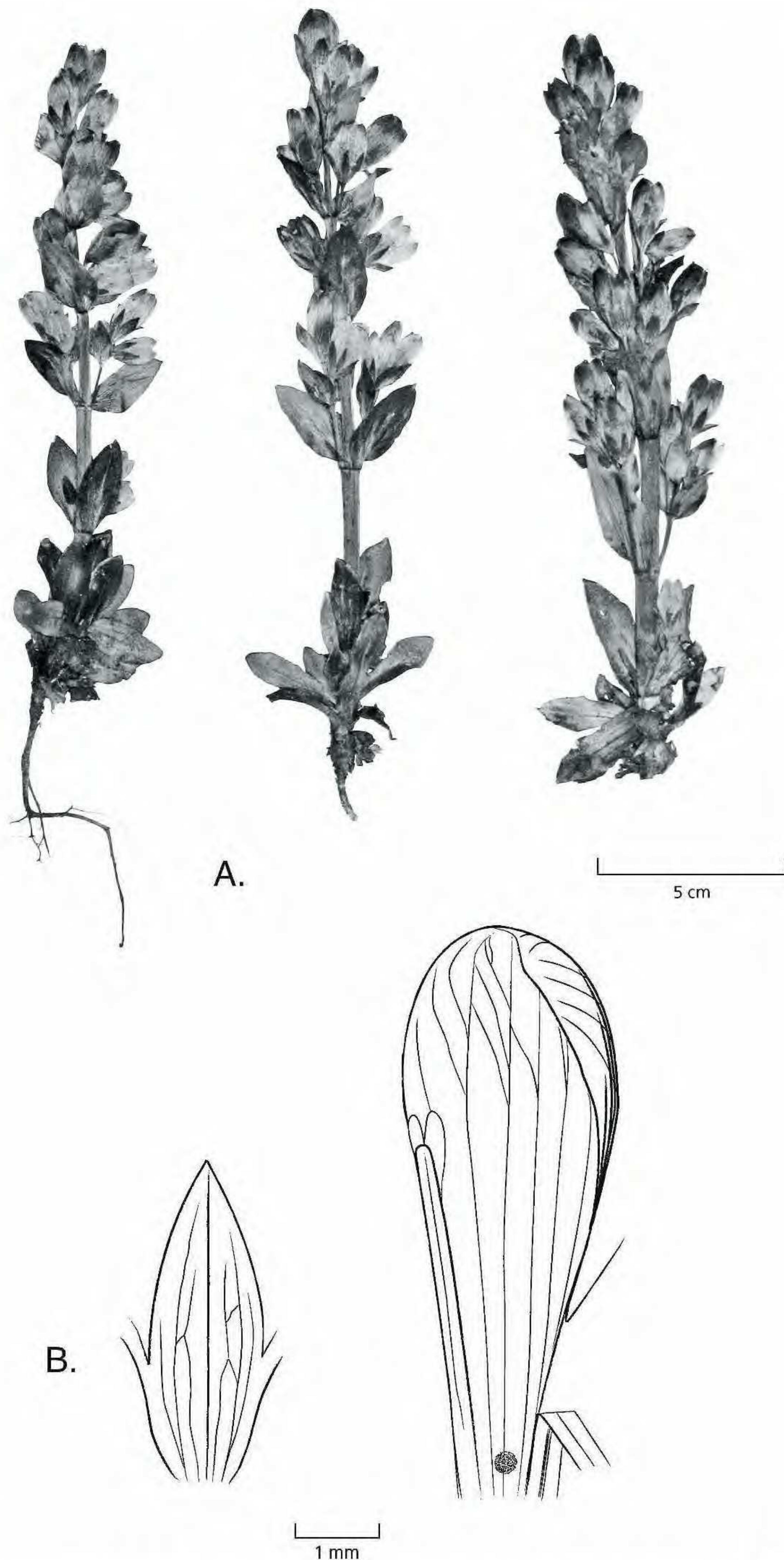


Figure 3. *Gentianella pyrostelium* J. S. Pringle. —A. Holotype, *Sánchez V. et al.* 11175, plants. —B. Details of flower, drawn from the same specimen: left, calyx lobe, abaxial view; right, corolla lobe and stamens, adaxial view.

adjective, it retains the Greek diminutive suffix *-ium* rather than ending in *-a*.

*Discussion.* Among the many Peruvian species of *Gentianella*, the combination of basal leaves in a

persistent rosette, a solitary main stem that is erect and proportionately stout for the height of the plant, a columnar inflorescence, and deeply lobed, red-and-yellow corollas that remain closed or nearly so gives *G. pyrostelium* a distinctive aspect. Its distally

narrowly winged capsule is perhaps unique among the Andean species of *Gentianella*.

Several other species with corollas that are yellow with red suffusions or longitudinal stripes along the exposed outer edges of the lobes, and that remain closed or nearly closed, are native from Ecuador south to Bolivia. The corollas of *Gentianella pyrostelium* appear to be most similar in size, shape, lobing, and color to those of *G. brunneotincta* (Gilg) J. S. Pringle, of northern and central Peru, and *G. hirculus* (Griseb.) Fabris, of Ecuador. Plants of those species are likewise low in stature, but have clustered, strongly decumbent stems bearing only one to four flowers each. In *G. brunneotincta* most of the pedicels are longer than the flowers. *Gentianella hirculus* differs further in its caespitose or patch-forming habit, with several to many flowering and vegetative stems present concurrently. The corollas of *G. hyssopifolia* (Kunth) Fabris, of Ecuador, are also similar, but differ in the presence of adaxial trichomes. Plants of *G. hyssopifolia* are usually 1.5–5 dm, with the distal internodes much longer than the proximal. Its leaves are linear to narrowly lanceolate, spreading arcuately, and its inflorescence is corymbose or umbelloid. *Gentianella raimondiana* (Wedd.) J. S. Pringle, of northern Peru, is likewise taller, with linear leaves to 8 cm, with the base connate-sheathing 2–4 mm long. In *G. erythrochrysea* (Gilg) Fabris, of Bolivia and Argentina, the pedicels are 1–5 cm, forming an open inflorescence, and the corollas are 20–30 mm.

- 4. *Gentianella rugicalyx*** J. S. Pringle, sp. nov.  
TYPE: Peru. La Libertad: Prov. Santiago de Chuco, Jalca de Coipín, 16 June 1984, A. Sagástegui A., J. Mostacero L. & M. Diestra Q. 11973 (holotype, HAM; isotypes, HUT not seen, MO, NY). Figure 4.

*Gentianellae paludicolae* (Gilg) J. S. Pringle et *G. persquarrosae* (Reimers) J. S. Pringle similis, sed a *G. paludicola* calycum lobis oblongis ad ovato-oblongis non acuminatis et corollae tubo gradatim dilatato, a *G. persquarrosa* foliis pluribus et corollis intus imberbis differens.

Synoeious. Plants tufted, perennial or at least flowering over a long period; stems several to many, strongly decumbent, 1–12 cm below terminal peduncle, simple or with a few short branches. Basal leaves narrowly spatulate-oblongate, 8–18 × 1.5–3 mm; cauline leaves in 1 to 5 pairs or occasionally more on longer stems, gradually decreasing in size distally, distal leaves mostly spatulate-elliptic, 5–12 × 1–2.5 mm; 2 distal leaf-pairs occasionally closely spaced, forming a near-whorl; all leaves obtuse; largest leaves

short-pseudopetiolate, others not pseudopetiolate, bases scarcely connate-sheathing or proximal pairs with sheaths to 1.5 mm, margins smooth, apices acute. Flowers solitary, those on branches smaller and later than those terminating main axis; peduncles 3.5–6(–10) cm on main axis, shorter on branches. Calyx 6–10 mm, midveins and commissural veins ridged; calyx lobes oblong to ovate-oblong, 2.5–4.5 × 1–2.5 mm (width at base), 1.6–2× as long as tube, obtuse to acute, with ± cartilaginous margins ca. 0.1 mm wide; adaxial colleters at base of calyx none; corolla widely campanulate, 10–17 mm, white, suffused with purple toward outer margin of lobes and along veins and sometimes less strongly so near base of lobes; corolla lobes elliptic-rhombic, 7–9 × 3–6 mm, 1.5–2.2× as long as tube, 1.6–2× as long as wide, apex rounded to subacute; adaxial trichomes absent; nectaries 5, inconspicuous, ca. 0.6 × 0.2 mm; filaments inserted at ca. 0.5× height of corolla tube, 4.5–7 mm; anthers 1.8–2.2 mm; ovary with indistinct stipe ca. 0.5 mm at anthesis; stigmas nearly semicircular, ca. 1 × 1 mm. Capsule not seen.

*Habitat and distribution.* All known specimens of *Gentianella rugicalyx* were collected at 3960–4150 m. Otherwise, information on the habitat of this species is limited to that on the herbarium labels, quoted here.

*Etymology.* The calyces of *Gentianella rugicalyx* are to varying degrees transversely wrinkled near and below the bases of the lobes, forming a “washboard” surface for which the species is named. In pressed specimens, this wrinkling is represented by kinks in the midveins as shown in Figure 4B.

*Discussion.* In combining low stature with strongly decumbent, mostly branched stems, *Gentianella rugicalyx* is similar in habit to *G. paludicola* (Gilg) J. S. Pringle and *G. persquarrosa* (Reimers) J. S. Pringle. *Gentianella paludicola*, of Ancash Department, Peru, differs in its acute leaves; lanceolate, acuminate calyx lobes proportionately narrower than those of *G. rugicalyx*; and more slender corolla tube, which expands more abruptly into the limb, forming a narrowly campanulate to funnelliform corolla. *Gentianella persquarrosa*, of Cusco Department, ca. 975 km to the south of the range of *G. rugicalyx*, is clearly monocarpic. It also differs from *G. rugicalyx* in its less leafy stems and usually in the presence of at least a few trichomes on the adaxial corolla surface. The pedicels of *G. persquarrosa* are more slender than those of *G. rugicalyx* and, although pedicel length in the two species overlaps, the average and maximum lengths are greater in *G. persquarrosa*, giving the inflorescence a more open aspect. Among other



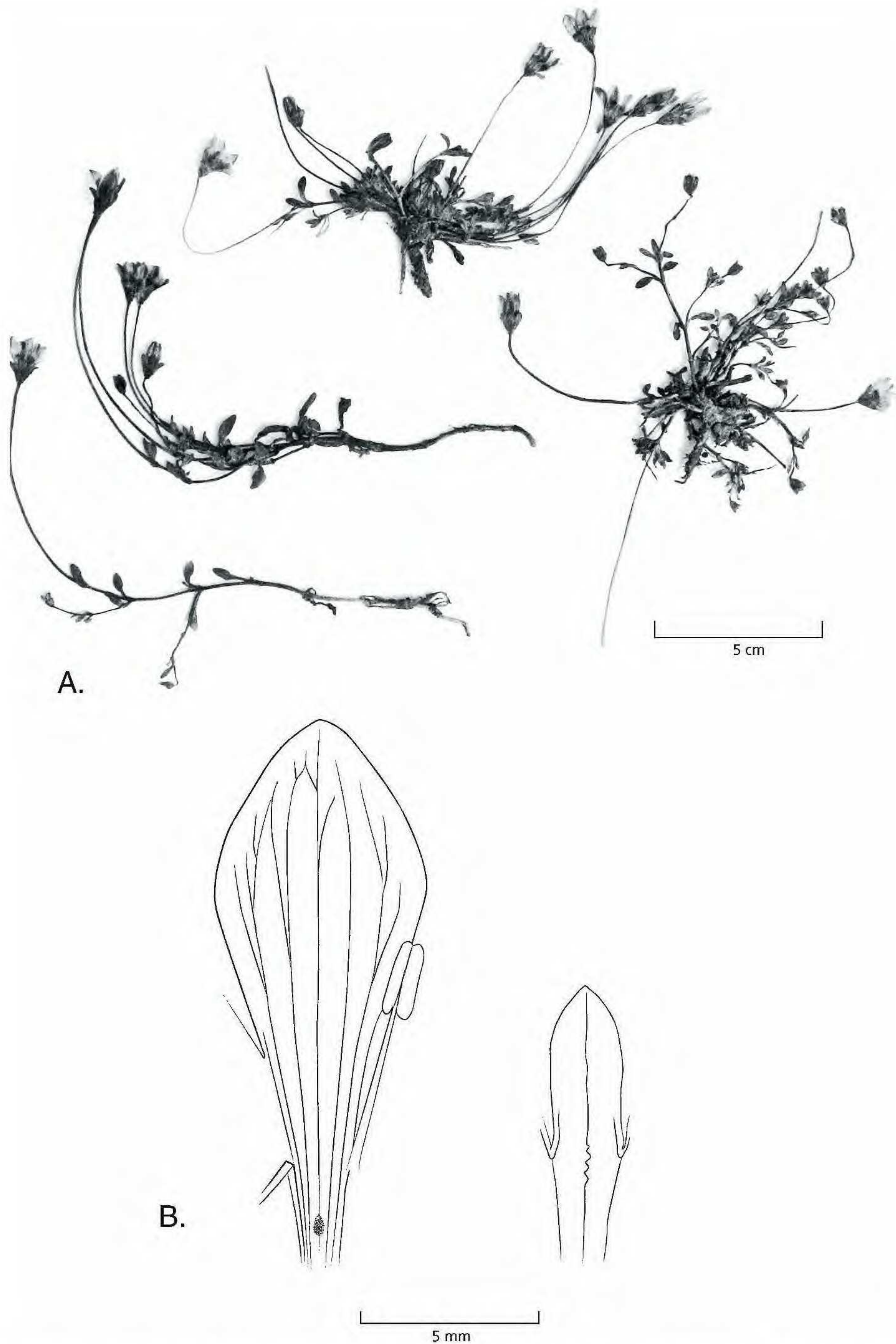


Figure 4. *Gentianella rugicalyx* J. S. Pringle. —A. Holotype, Sagástegui A. et al. 11973, plants. —B. Details of flower, drawn from the same specimen: left, corolla lobe and stamens, adaxial view; right, calyx lobe, abaxial view.

species similar in habit, *G. dolichopoda* (Gilg) J. S. Pringle, of Cusco Department, has glossier leaves, of which the largest are ca. 30 mm with slender pseudopetioles to half as long as the expanded

portion, fewer basal and proximal cauline leaves, and yellow-throated corollas 16–23 mm. *Gentianella centamalensis* (Gilg) Zarucchi, of Amazonas Department, Peru, and *G. potamophila* (Gilg) Zarucchi, of

Apurímac, Arequipa, Ayacucho, and Cusco departments, differ in having corollas 16–25 mm with adaxial trichomes near the insertion of the stamens. *Gentianella centamalensis* differs further in its lilac, less deeply lobed corollas, and in *G. potamophila* a narrow, sharply demarcated dark purple zone, rather than a suffusion, extends along the outer edge of each corolla lobe. *Gentianella petrophila* (Gilg) Zarucchi, of Junín Department, Peru, differs in its narrower, acuminate calyx lobes and corolla lobes ca. 4× as long as the tube and proportionately narrower than those of *G. rugicalyx*. In *G. cerrateae* Fabris, of Ancash Department, the corolla lobes are shorter than the tube. In *G. sandiensis* (Gilg) J. S. Pringle, of southern Peru and Bolivia, the flowers are generally solitary, with no branching of the primary stems unless near the base, and the calyx lobes are shorter than to about as long as the tube.

*Paratypes.* PERU. **La Libertad:** Prov. Santiago de Chuco, Pampa de la Julia (al este de Quiruvilca), 23 May 2001, S. Leiva G. & P. Leiva 2574 (F not seen, HAM, HAO not seen); Prov. Santiago de Chuco, Jalca de Quesquenda, 7°55.3'S, 78°10.2'O, 23 May 2001, A. Sagástegui A. & M. E. Zapata C. 16576 (F not seen, HAM, HAO not seen).

**5. *Gentianella sanchezii* J. S. Pringle, sp. nov.**

**TYPE:** Peru. Cajamarca: Prov. Cajamarca, SAIS, José Carlos Mariátegui, Km 15 on Sunchubamba–San Juan Rd., meadow, 5 June 1984, D. N. Smith & I. Sánchez V. 7517 (holotype, MO; isotype, HAM). Figure 5.

Inter *Gentianellas* andinas caulibus gracilibus e rosula persistente ortis, pedicellis quam internodiis plerumque longioribus et corollis late infundibuliformibus roseolilacinis 16–30 mm longis lobis spatulato-obovatis quam tubo duplo longioribus distinguenda.

Synoeious; plants monocarpic; taproot persistent; height 6–20 cm including pedicels and flowers; stems clustered, 2 to 14, glabrous, slender, ca. 1 mm diam. near base, to 13 cm (measured to most distal node in inflorescence); central stems ± erect, those toward periphery ± decumbent. Leaves medium to dark green, only midrib conspicuous, margins minutely roughened, bases of basal and proximal cauline leaves connected by low ridge or connate-sheathing to ca. 2 mm, distal leaf bases free; basal rosette leaves 6 to 16, present at flowering time, spatulate to oblanceolate or oblong, mostly 13–40 × 3–11 mm, narrowed at base or some leaves pseudopetiolate, obtuse to subacute at apex; cauline leaves sharply differentiated, 10–28 × 1–6 mm, narrowly elliptic or distal pairs linear, apex acute. Primary stems each forming a 3- to 6-flowered, monochasial or partly dichasial cyme, without or occasionally with 1 pair of

leaves below first division, or stems of smallest plants bearing only 1 or 2 flowers; 1 to 5 internodes proximal to ultimate peduncles; proximal internodes mostly 1–5 cm, distal internodes (if any) usually longer; total flowers per plant 2 to ca. 50; pedicels mostly 20–75 mm, longer than internodes; smaller flowers occasionally present on shorter pedicels. Flowers erect; calyx obconic, 11–16 mm, tube and lobes ridged along midveins and commissural veins, giving tube a ribbed appearance; calyx lobes 5–9 mm, (1–)1.5–2× as long as tube, outer lobes lanceolate-triangular to oblong, 1.9–2.5 mm wide at base, inner lobes lanceolate-triangular to linear-oblong, 1–1.8 mm wide at base, margins smooth, apices acute to acuminate; adaxial colleters at base of calyx few; corolla pale purple to pink, widely funnelform, 16–30 mm; lobes spatulate-obovate, 11–17 × 6–9 mm, 1.8–2× as long as tube (or less in smallest flowers), 1.9–2.3× as long as wide, apices obtuse to abruptly acute, sometimes apiculate; trichomes absent; nectaries 5, ca. 0.8 × 0.6 mm; filaments inserted at ca. 0.8× height of corolla tube, 6.5–10 mm; anthers probably pale yellow when fresh, ca. 0.8 mm; ovary with indistinct stipe ca. 0.6 mm at anthesis; stigmas ± semicircular, 0.8–1 × 1–1.2 mm. Capsule not seen.

*Habitat and distribution.* The type of the name *Gentianella sanchezii* was collected at 3160 m and the paratype at 3824 m. Otherwise, information on the habitat of this species is limited to that on the herbarium labels, quoted here.

*Discussion.* In its open inflorescences with proportionately long pedicels, the size of its calyx and corolla, and the shape of its calyx and corolla lobes, *Gentianella sanchezii* is similar to *G. cuspidata* (Griseb.) J. S. Pringle, of Junín and Lima departments, Peru, ca. 500 km to the southeast, and to *G. campanuliformis* (Reimers) Fabris, of Cusco Department, ca. 1000 km to the southeast. Both *G. cuspidata* and *G. campanuliformis* differ in being tufted perennials with a distinct caudex, whereas *G. sanchezii* is evidently monocarpic, with a slender taproot and no caudex development. *Gentianella sanchezii* further differs from *G. cuspidata* in its much lower stature, more slender stems, fewer flowers per primary stem, less strongly sheathing leaf bases, and basal leaves that are less distinctly and shorter- or non-pseudopetiolate, and from *G. campanuliformis* in its fewer basal leaves and proportionately narrower basal and cauline leaves.

In some aspects of habit and corolla morphology, *Gentianella sanchezii* resembles *G. calanchoides* (Gilg) Fabris, of Huancavelica, Huánuco, and Junín departments, and *G. centamalensis* (Gilg) Zarucchi, of

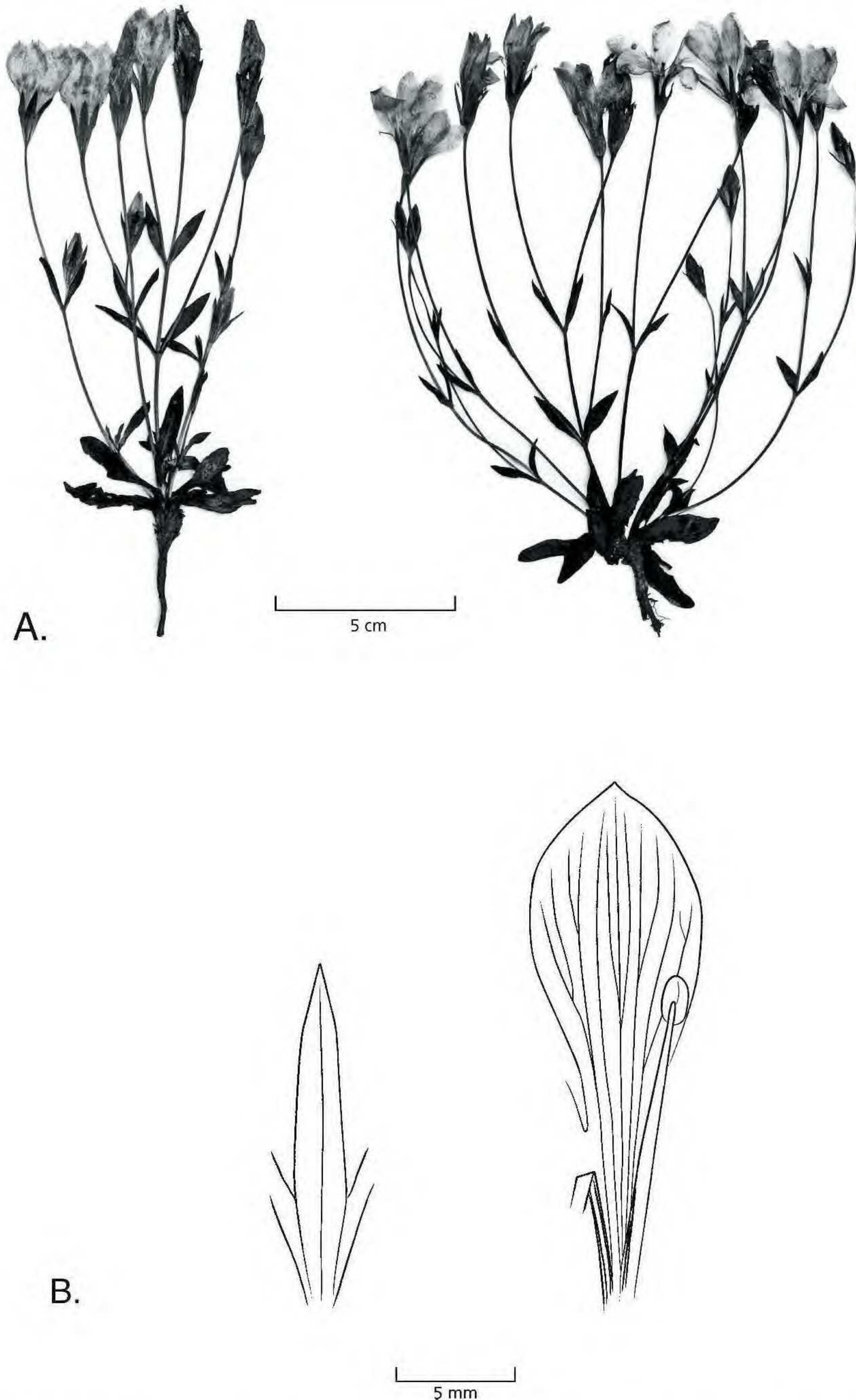


Figure 5. *Gentianella sanchezii* J. S. Pringle. —A. Holotype, *Smith & Sánchez V. 7517*, plants. —B. Details of flower, drawn from *Sagástegui A. & Zapata C. 16456* and *Smith & Sánchez V. 7517*: left, calyx lobe, abaxial view; right, corolla lobe and stamen, adaxial view.

Amazonas Department, but those species are perennials with stout caudices and have less deeply lobed corollas with numerous trichomes on the adaxial surface. From *G. roseolilacina* (Gilg) J. S. Pringle, of Ancash Department, *G. sanchezii* differs in its larger

leaves, longer internodes and pedicels, larger flowers, and more deeply lobed corollas. Other *Gentianella* species in northern Peru to which *G. sanchezii* is more or less similar in stature and in the number of flowers per stem differ in having distinctly smaller flowers

and/or in the proportionate depth of the lobing of the corollas.

*Paratype.* PERU. **La Libertad:** Prov. Sánchez Carrión, Comumbamba (subiendo al nevado Huaylillas), 7°51.9'S, 78°01'O, ladera, 20 May 2001, A. Sagástegui A. & M. Zapata C. 16456 (F not seen, HAM, HAO not seen).

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